Heatless Desiccant Air Dryer

User guide

nano–porous systems

Dryer range:

- NDL 010
- NDL 020
- NDL 030
- NDL 040
- NDL 050

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1. General information

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Heatless Desiccant Air Dryer - User Guide

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1.1 Document introduction

This guide provides factory prescribed procedures for the installation, operation and maintenance of a nano-porous systems compressed air dryer. The procedures illustrated in this document are only to be performed by authorised personnel. For further information regarding the procedures outlined in this document contact nano-porous systems limited before proceeding.

Read this document carefully before attempting to install, operate or maintain the dryer. This document should be permanently available at the dryer installation site and be kept in an easily accessible place alongside the dryer.

Annotations

CAUTIONS: indicate any situation or operation that may result in potential damage to the product/user, or render the product unsafe.

NOTES: highlight important sections of information where particular care and attention should be paid.

1.2 Manufacturer's details

For all enquiries please contact our Head Office:

1.3 Warranty guidelines

All dryers are supplied with a 12 month manufacturer's warranty from the date of purchase.

For further information please refer to the 'warranty guidelines' section on our website: www.ctarefrigeracion.com

1.4 Packaging

All dryers are securely packaged in a bespoke moulded packing system. The dryer will be secured in a horizontal position using two specifically moulded support cushions.

The support cushions within the package permits longitudinal stacking; however the central section of the packing box is not load bearing.

Damage to the packaging

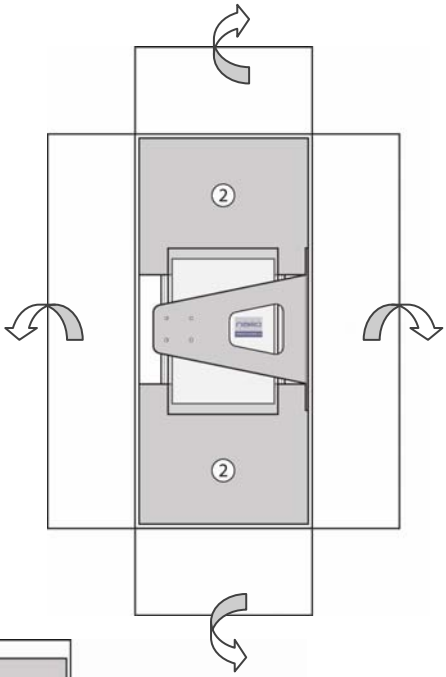
- Check immediately to establish whether damage has occurred to the external packaging and if the damage extends to the product inside.
- If there is damage to the dryer, contact the relevant supplier immediately.

In no circumstances must a damaged dryer be used in operation. Using damaged products can lead to irreparable functional faults or cause serious physical harm.

1.5 Dryer contents

1. **1 x Heatless desiccant-air dryer**
2. **Packaging:**
   - o 2 x Packing support cushions
3. **3 x power IEC cables:**
   - o 1 x UK
   - o 1 x Europe
   - o 1 x North America
4. **Dryer stand components:**
   - o 2 x Brackets*
   - o 8 x M4 socket button head screws*
   - o 1 x Allen key

*** Note:** Models 040 & 050 supplied with: 4 x Brackets & 16 x M4 hex socket button head screws for wall mounting.



5. **Documentation:**
   - o 1 x User guide

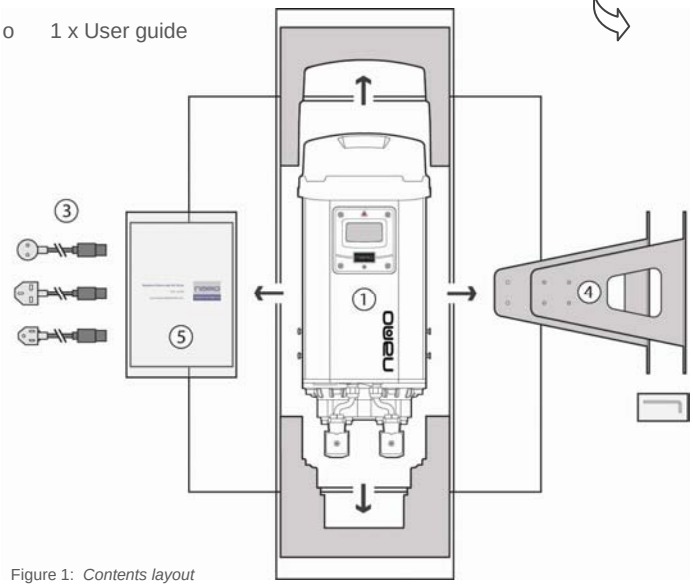


Figure 1: *Contents layout*

2. Technical description

The n-psl dryer uses the pressure swing adsorption principle of drying compressed air, utilising two identical columns each containing a hygroscopic desiccant bed.

Figure 2: *Dryer section*

Wet air enters the dryer through the inlet valve and is directed into one of the columns.

- Each column contains a unique (patented) desiccant cartridge.
- Bulk liquids and particles are removed by the filtration stage on the inlet to the cartridge.
- Water is retained in a collection chamber until the column is regenerated (Vented to atmosphere as the column is depressurised).
- Air then passes through the desiccant bed where any remaining moisture is adsorbed.
- The dry air passes out through the final particulate (<1micron/ISO8573.1 Class 2).
- Simultaneously, a small amount of dry filtered air is counter flowed down through the other cartridge and exhausted to atmosphere. Removing the moisture and regenerating the desiccant bed.
- The dryer controller periodically switches columns after top end repressurisation; ensuring a continuous supply of dry air at constant pressure.

  The dryer can also be controlled using a Zero Volt signal from the compressor. This energy saving mode (eco) senses when the compressor is switched off and stops the dryer operation until the compressor restarts.

3. General safety

For your own safety, when carrying out work on the dryer, please comply with all relevant national safety regulations relating to pressurised systems.

3.1 Intended use of the dryer

The dryer is exclusively intended for drying compressed air, which is free from bulk water, oil and solid matter constituents.

The dryer should be sited within a building and protected against the weather. The dryer must be operated only in accordance with the data on the rating plate and in accordance with the contractual conditions. Any operations that do not comply with those stated on the product rating plate will render the warranty void.

This dryer is only designed to operate at pressures of between 4 barg and 12 barg. It is not suitable for pressures in excess of 12 barg.

No modifications must be made to the dryer. Any modifications may reduce the operational safety of the dryer and invalidate the manufacturer's warranty, potentially resulting in damage to the product or cause serious personal injury

3.2 Personnel

Only authorised and qualified personnel are permitted to work on the dryer. This operating manual is intended solely for such personnel and is to be used only as a reference; it should not be used to replace conventional training.

3.3 Safe handling

Please ensure the relevant national safe handling procedures are employed when lifting or moving the dryer.

Where possible use a suitable lifting aid to minimise the risk of physical injury or damage to the product.

4. Installation & operation

4.1 Typical installation

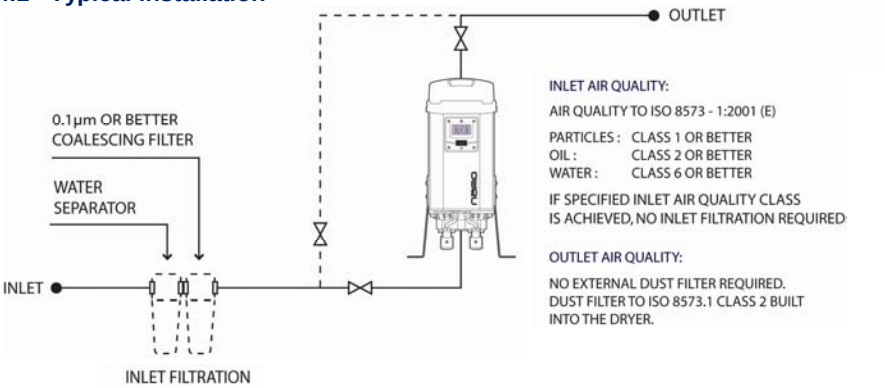


Figure 3: *Dryer installation*

4.2 Site selection

When selecting an installation site for the dryer, the following conditions should be met:

- Installation site should be protected from the weather and other harmful conditions.
- The ambient temperature must not drop below +1°C.
- The installation site should be level and able to support the weight of the dryer.
- Ensure sufficient space around the dryer, to allow access for operation and maintenance.
- Dryer must be mounted vertically as shown.

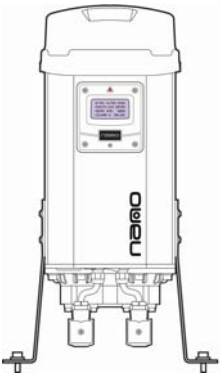


Figure 4: *Floor mounted*

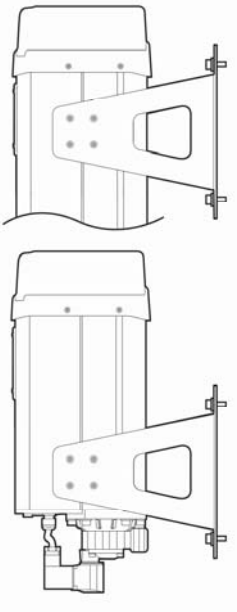


Figure 5: *Wall mounted*

*** Note:** Mounting bolts not supplied. Additional bracket provided for wall mounting sizes 040 & 050.

4.3 Dryer start-up

- Electrical connections.
    - To set up for compressor eco mode. Remove the link between pins 1 and 4 in the Hirschman connector, located underneath the dryer. A zero volt switching signal from the compressor needs to connect between pins 1 and 4.
    - When the connection is made, the dryer will operate normally. If the connection is broken, i.e. the compressor has achieved maximum operating pressure and has switched off; the dryer will also stop cycling and go into standby mode, displaying “compressor off” on the display.

Under no circumstances should external voltage / current be applied to pins 1 and 4, damage to the controller will occur, negating the warranty.

    - The signal could also be from dryer specific point of use equipment.
    - Pins 2&3 on the Hirschman connector provide a zero volt alarm output for customer control panel indication. These pins are connected to a relay within the controller which will close when the service or dew-point conditions arise.
- Connect the IEC power supply underneath the dryer using the retaining clip to secure in position.

Do not allow the dryer to flow air unless powered up, switched on and cycling. Resulting effect could be cartridge contamination; requiring replacement cartridges.

- Connect all pipe work.
    - Ensure the inlet operating pressure parameters are between 4-12 barg.
    - Ensure the inlet air temperature is between 1.5°C-50°C.
- Open the inlet and outlet valves.
- Turn on the dryer using the switch located underneath the front of dryer body.
- The dryer will display its status and commence normal operation. When the dryer is powered up the display will show “initialising dryer” for approximately 20 seconds, ensuring the dryer is in equilibrium state before commencing operation.

4.4 Monitoring dryer performance (Energy saving option)

- The dew-point is displayed on the control panel. When the dew-point displayed is better than -48℃ PDP the dryer will switch into ec onomy mode and stop cycling. When the dew-point degrades to -42℃ the dryer will restart cycling ensuring the dew-point is maintained at or better than -40℃.
- If the dryer fails to achieve dew-point (falls below -30℃), the alarm output will be indicated on the front screen. This will permit the end user to provide for example a 4-20mA signal through this switch to a remote monitoring station elsewhere.

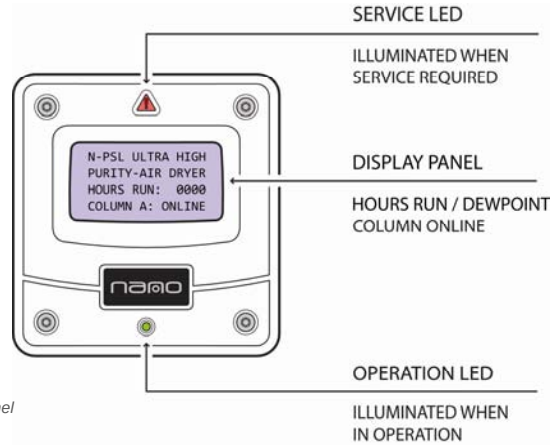


Figure 6: *Control Panel*

4.5 Shutdown procedure

- Switch off the power supply to the dryer.
- Close the inlet and outlet valves.

The dryer might still be pressurised! In order to de-pressurise the dryer; ensure the dryer is isolated from the compressed air source:

  - Cycle the dryer twice to ensure the dryer exhausts and is completely depressurised.
  - When fully depressurised the ‘clicking’ of the exhaust valves will be heard but no air exhausted.

- When the dryer is fully depressurised, isolate from the power supply.

5. Maintenance

Maintenance operations should only be carried out by authorised personnel.

5.1 Maintenance guidelines

- Maintenance operations only to be conducted when the system has been shut down and fully depressurised.
- All connections must be undone with care, paying particular attention to the areas that become pressurised.
- Do not modify or adjust the control settings.
- Only certified n-psl approved replacement parts to be used.
- Always check all connections for leakage and secure seating.
- Ensure all loose parts are removed or secured to the dryer before operation.

5.2 Daily checks

Visual and functional check of the dryer should be carried out daily:

- Check the dryer for any external damage.
  Assess and eliminate any defects found.

- If the red service light appears, the dryer must be serviced.
  Contact the service department and request a dryer service kit.

- Remove any loose dust or dirt from the dryer; clean all surfaces that appear to have attracted unwanted contaminants.

- Check the dewpoint sensor display (where applicable). If the dew point is not achieved the dewpoint reading on the display will alternate with “dewpoint alarm” every 5 seconds. The no-volt alarm will also activate.
  Contact the service department and request a product service.

5.3 Dryer service

A full product service is advised to take place every 2 years or 12,000 hours of operation (whichever occurs first). A dryer specific service kit is available, including all of the necessary replaceable components and servicing equipment.

6. Troubleshooting

Problem	Probable Cause	Solution
Poor Dew point Performance	1. Insufficient inlet pressure	*1. Inlet pressure = min 4 bar. If not adjust inlet pressure settings.*
	2. Electrical Fault	*2. Ensure the power is on and the dryer front panel is illuminated; check the dryer is cycling correctly.*
	3. Moist or contaminated desiccant	*3. Eliminate the cause of contamination. Change cartridges – do not re-use.*
	4. Too high air consumption	*4. Ensure the performance of the dryer matches the required air consumption.*
	5. Excessive inlet air temperature	*5. Check against technical specification.*
	6. Insufficient purge air	*6. Purge incorrectly adjusted. Consult service personnel to adjust settings (Factory pre-set).*
	7. Exhaust silencer blocked	*7. Consult service personnel.*
Failure of Dryer to cycle	8. Controller not functioning correctly	*8. Ensure the controller is powered; check the on screen column status to ensure it is powering the exhaust valves during normal cyclic operation.*
	9. insufficient inlet pressure	*9. Inlet pressure = min 4 bar. If not adjust inlet pressure settings.*
	10. Failure to de-pressurise when cycling	*10. Solenoid valve not functioning correctly; if there is power to the coil, replace valve. A correctly working valve outputs an audible click when it energises. .*
	11. Outlet flow stops	*11. Check inlet air supply.*
Constant de-pressurisation	12. Failure to initialise dryer	*12. Switch off and restart dryer. Ensure air supply is on before powering dryer to allow dryer to initialise before commencing operation.*
	13. Erratic air flow from exhaust	*13. Faulty or damaged valve; service required.*

Reference to known misuse

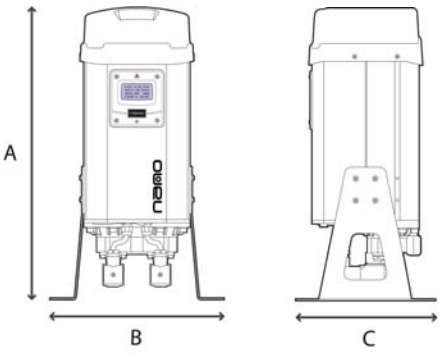
- **Opening the inlet valve too quickly.**
  Valve should be opened slowly allowing the pressure to build up gradually.
- **Inlet/outlet head pipe**
  Diameter too small.
  Pipework unsupported.
  Inlet pipework from low point in system, allowing bulk water to collect and enter the dryer.
- **Electrical controller**
  Incorrect fuse fitted or fuse blown. Check the plug and fuse located underneath the dryer.
- **Additional Items**
  Use of non-authorised components.
  Untrained / unauthorised maintenance / installation personnel used.
  Increase in air consumption without relation to the flow capacity of the dryer.
  Purging the dryer with cleaning agents that could damage the components or the desiccant.
  Covers removed or loose during operation.
  Failure to carry out a service when indicated by the dryer.
  Do not allow the dryer to flow air unless powered up, switched on and cycling. Resulting effect could be cartridge contamination; requiring replacement cartridges.

7. Technical specification

Model	Inlet Flow Rate		Connection (BSPP)	Dimension (mm)			Weight (approx)		Dimension (inch)			Model with Energy Saving (Includes dewpoint sensor)	Service Kit
	Nm^3/hr	scfm		A	B	C	lbs	kg	A	B	C		
NDL-010	5.1	3	G 3/8"	447	241	160	18.2	8.3	17	9	6	NDL-010-ES	NDK-010
NDL-020	8.5	5	G 3/8"	447	241	160	18.2	8.3	17	9	6	NDL-020-ES	NDK-020
NDL-030	17	10	G 3/8"	647	241	160	28.2	12.8	25	9	6	NDL-030-ES	NDK-030
NDL-040	25.5	15	G 3/8"	897	241	160	36.1	16.4	35	9	6	NDL-040-ES	NDK-040
NDL-050	40.8	24	G 3/8"	1097	241	160	42.5	19.3	43	9	6	NDL-050-ES	NDK-050

- Flow rates are based on air inlet pressure of 7.0 barg (100 psig) and temperature of 37.7C (100F).
- For dryer performance at other inlet conditions or -70C (-100F) dewpoint requirements, Please see www.compressedairtreatment.com.
- Where the air source is from an oil lubricated compressor, we recommend that a 0.1µm or better coalescing filter be installed on the inlet to the dryer.

Specification	
ISO8573 – 1: 2001 Quality Classes	Class 2: Dirt: 1µ Class 2: Water: -40°C (-40°F) PDP
Minimum working pressure	4 barg (58 psig)
Maximum working pressure	12 barg (174 psig)
Power supply	100 – 240VAC / 50 – 60Hz
Minimum inlet temperature	1.5°C (34.7°F)
Maximum inlet temperature	50°C (122°F)



Cartridge removal height allowance		
Dryer	(mm)	(inches)
NDL 010	310	13
NDL 020	310	13
NDL 030	520	21
NDL 040	760	30
NDL 050	1060	42

* Dimension taken from top of manifold

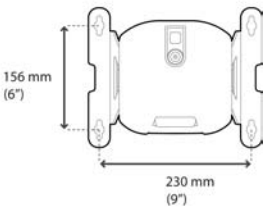


Figure 7: *Dryer size guide*

Notes: